NAVAL POSTGRADUATE SCHOOL
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AN ECONOMIC ANALYSIS OF THE
ALTERNATIVES FOR PROVIDING
MILITARY FAMILY HOUSING AT
NPS MONTEREY, CALIFORNIA

by

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An Economic Analysis of the Alternatives for Providing Military Family Housing at NPS Monterey, California

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ABSTRACT

This thesis examines alternatives for increasing the supply of Military Family Housing (MFH) at NPS Monterey, California. Military construction, the traditional program, is compared with five other means by which the inventory of MFH units could be increased. Costs for each of the options are analyzed using accepted DoD cost models. Conclusions and recommendations regarding the most viable alternative for increasing the supply of MFH are provided in the final chapter. Analytic cost computations are provided within the Appendices.

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I. INTRODUCTION

A. THE ISSUE

The 1980's federal budget deficit growth and the apparent Warsaw Pact dissolution have had a profound impact on defense spending. The 1991 Department of Defense (DoD) budget authority has been set at $288 billion, a significant cut from 1990. The current Six Year Defense Plan calls for approximately a 19 percent decline in real dollars from the 1990 baseline by fiscal year 1995. [Ref 1:p. 1] Within this fiscal environment, defense decision-makers are faced with the task of meeting their operational objectives while streamlining the DoD organization.

At the same time that emphasis is being given to cutting defense dollars, there is rising concern for the quality of life that military personnel and their families experience. The 1989 Defense Management Review cited quality of life as the top priority for military leaders. During testimony before the House Budget Committee, Secretary of Defense Richard Cheney said, "We must continue to recruit and retain high quality military professionals emphasizing their training, quality of life and career satisfaction." [Ref 2] Further, Secretary of the Navy H. Lawrence Garrett III has stated that "improving the quality and quantity of family housing in the Navy and the Marine Corps is one of my top priorities." [Ref 3]

Secretary Garrett, like many within DoD, recognizes family housing as a crucial aspect to a military family's quality of life and its impact on the retention of quality personnel. This research effort focuses on improving the Military Family Housing (MFH) situation within a budget-conscious environment. The MFH at the Naval Post Graduate School (NPS) in Monterey, California was examined as a case study to determine DoD costs in meeting the housing improvement objective. Specifically, the shortage of available military housing units for the NPS population was addressed. Initial research on NPS family housing was conducted by a group of NPS students in December 1989 [Ref 4].

The NPS student study identified several key issues concerning the utilization and assignment of MFH at NPS:

1. MFH is considered a desirable good by the NPS population and it is also a scarce good. That is, MFH supply is not sufficient to meet demand.

2. The NPS population is unlike most military installations in that it is a composite of United States (US) military personnel, DoD civilians and foreign military students. All three segments of the population desire MFH.

3. Under the housing assignment policy promulgated by OPNAVINST 11101.13h, housing assignment is not based on greatest need, but on a system of availability by grade for US officers. DoD civilians or foreign students will be offered assignment to MFH only when an excess of housing exists beyond US military

needs. This policy violates the economic principle known as Rawlesianism.

4. Under the current housing assignment policy, consideration is not given to allocating the housing good to maximize utility (defined as cost savings accrued in military personnel's housing pay entitlement). Thus, the current assignment policy violates the economic principle of Utilitarianism.

An alternative housing assignment policy was proposed by the NPS students. It adhered closely to the Rawlesian concept of assigning priorities based upon need. In this manner, foreign students were given top priority since they were deemed to have the greatest economic need. While economically sound, this policy violates the socio-economic intent of OPNAVINST 11101.13H to provide housing for US active duty personnel and dependents [Ref 5:p. 1]. Additionally, the dollar cost to the US government would be higher under this policy. The higher cost results from increased pay (Bachelors Allowance for Quarters (BAQ)/Variable Housing Allowance (VHA)) to US military officers supplanted from MFH and required to live in the civilian community.

Currently, all NPS foreign students and DoD civilian students live in civilian housing due to MFH shortages. Many US military students occupy civilian housing due to the MFH shortage as well. Student use of private sector housing in the Monterey area is more costly to both students and DoD. Therefore, the

NPS family housing problem extends beyond the NPS housing authority's assignment policy. Quality of life for the military family and DoD cost considerations must be addressed as well.

The research effort presented in this thesis is focused on identifying the most economical means to provide housing for the NPS population. A military family's quality of life can be increased through the economic savings obtained by living in military quarters. Once an MFH area is built and established, DoD may expect annual cost savings since members occupying MFH are not paid BAQ or VHA. The issue, then, is to increase the MFH supply to meet the NPS population's demand while minimizing costs to DoD.

B. BACKGROUND

Within the Department of the Navy, OPNAVINST 11101.13H provides a policy and criteria governing the assignment to, and utilization of, Navy managed MFH. The principal objective of the program is to insure that members of the armed forces with dependents are suitably housed. Assignment procedures and utilization have been designed to provide the greatest opportunity for occupancy by the greatest number of eligible personnel.

It is current DoD policy to rely on the local private sector housing market in communities near military installations as the primary source of housing for military families. BAQ is paid to eligible members required to obtain civilian housing when

MFH is not available. VHA is paid to eligible members to help defray civilian housing costs that exceed BAQ. VHA is set at a maximum amount for a given area based on that community's historical housing costs. The maximum is computed such that it should offset approximately 85% of the military family's housing costs (rental cost plus utilities). [Ref 5]

MFH is constructed only in those locations where the civilian housing market cannot meet the local military community's demand. "Meeting the military community's demand" is not confined to being capable of providing housing only, but extends to providing affordable housing as well. The recent inflation of home rental prices in some areas of the country has placed an extreme hardship on many military personnel. Also, it is costly to DoD to provide VHA allowances in high-cost areas. As a result, DoD has elected to build new MFH at such installations as Fort Ord and NAS Moffett Field which are located in high-cost areas. New MFH construction requires Secretary of Defense approval and congressional appropriation.

Military personnel, with accompanying dependents, who are in paygrades E-4 and above and have over two years of service are eligible for MFH. Accompanying dependents are considered to be those dependents who may be expected to reside with the member for nine months or more each year. Military personnel without dependents are not eligible for MFH. When both husband and wife are members of the uniformed services, they are eligible as long as they are homeported in the same vicinity.

Civilian DoD personnel are eligible for MFH with certain restrictions. They must be considered essential DoD employees or DoD sponsored employees of a GS-5 grade or better. They must be accompanied by dependents if in the continental United States (CONUS). Finally, they are granted quarters only if there is an excess of MFH that is not expected to be utilized by US military personnel. NPS civilian students are eligible for MFH. To occupy MFH, DoD civilians are required to pay a rental price.

Foreign military officers are eligible for MFH if their government has a specific agreement with the United States. In the absence of such an agreement, foreign military officers in the Personnel Exchange Program (PEP), Foreign Military Sales (FMS) and International Military Education and Training (IMET) programs are eligle for MFH subject to the local housing authority's approval. NPS foreign students are part of the FMS and IMET programs, and they are eligible for NPS family housing. [Ref 5]

C. OBJECTIVE

Rising home rental prices and home mortgage costs have had a significant impact on DOD and its personnel. In the past, DoD relied primarily on the private sector housing market to provide for the housing needs of its members. Today, service members are required to spend a significant portion of basic pay in addition to BAQ/VHA to offset home inflation. DoD is required to

spend increasing amounts of its budget to aid in offsetting rising civilian housing costs.

The focus of this thesis is a cost-benefit analysis of alternative means to provide family housing to the military population. Illustrative cost figures are provided using the MFH situation at the Naval Post Graduate School as a case study.

D. RESEARCH QUESTIONS

The primary research question is: What is the most economical means for the provision of quality family housing to military staff and student populations at NPS?

Subsidiary research questions are:

-Which categories of the NPS population are affected by the MFH shortage at NPS and what housing unit sizes are required to meet their demands?

-What are the costs and payback period required to build new military construction sufficient for NPS needs?

-What are the expected costs and benefits for a private-public venture to build family housing to meet NPS demand?

-Does DoD benefit economically by building more MFH units such that supply equals demand?

E. SCOPE, LIMITATIONS AND ASSUMPTIONS

The main thrust of this study is to examine the DoD costs associated with providing family housing to entitled military personnel. The housing costs for staff and students at NPS

are used as a case example. In particular, alternative sources for military family housing will be explored with the resultant costs and benefits to DoD and beneficiaries.

The research is limited to officer housing since the housing provided by the NPS housing authority is exclusively for officers. NPS enlisted personnel receive their family housing through the Fort Ord Housing Office.

The NPS housing situation makes a good case study due to its location in the high-cost Monterey area. Many Navy facilities are based in similar high-cost areas and can be expected to experience similar problems and require similar solutions.

It is assumed that Fort Ord may close as required by the 1990 Base Closure List [Ref 6]. Further, the assumption is made that NPS will be given the opportunity to acquire Fort Ord properties through a no-cost interservice agreement if sufficient need is demonstrated. Also, it is assumed that the reader is familiar with standard DoD military family housing policies and terminology.

F. RESEARCH METHOLOLOGY

This thesis is a case study. Research data was collected through telephone interviews, personal interviews and a literature search. Interviews were conducted with personnel at the Fort Ord Housing Office, NPS Housing Office, Fort Ord Real Property Office, Army Civil Corps of Engineers, Monterey Chamber

of Commerce, NPS Registrar Office, Monterey Director of Engineering and Maintenance Office and Monterey realty offices.

The literature review included Congressional legislation and correspondence, General Auditing Office briefings, DoD correspondence, Logistic Management Institute studies, Naval instructions and memorandums, a private sector-public venture lease agreement, and costing data for new military construction projects.

G. ORGANIZATION OF THE STUDY

The thesis is divided into five chapters, beginning with this introduction. Chapter II provides background information on NPS military family housing. Chapter III presents alternatives which may be pursued to increase the MFH supply at NPS. Chapter IV provides an analysis of the data gathered for the alternative plans. Chapter V summarizes the findings and draws conclusions and recommendations based on the findings.

II. MILITARY FAMILY HOUSING

A. POPULATION

Statistics reveal that over the past three years the NPS population pertinent to this study has averaged 1950 individuals in four categories. The most recent figures for June 1990 indicate a total population of 2085 broken into the following categories:

US Military Officers (NPS staff)	130
US Military Officers (NPS students)	1,674
DoD Civilian Students	20
Foreign Students	261
Total	2,085

The increase of 135 students over past years' average is attributed by the NPS Registrar's office to the large classes which began arriving in June 1989 [Ref 7]. The NPS population may not be able to continue this growth over the next several years. The NPS forecaster, Mr. Michael Trehan, explained that the capacity of the school is 1950-2000. Barring new construction, the school cannot accept an enrollment larger than these numbers [Ref 7]. Assuming the number of staff members remains constant, the maximum population expected over the next several years is between 2,080 and 2,130 (1950-2000 students plus staff). As of June, our population of 2,085 falls within this maximum range. Thus, we can expect little real increase in

the size of our population over the next several years. At the same time, the recent trend toward meeting the 100 percent quota for student enrollment suggests the population size will not decrease significantly.

The NPS population can be more narrrowly categorized by paygrade. These categories are used both in US military housing pay allowances and MFH assignments. The largest percentage of the population is made up of US officers in the O-3 paygrade (approximately 73 percent). The smallest paygrade group consists of officers in O-5 paygrade and above (approximately four percent).

Table II.1, a composite of the total population, reveals the numbers of our population within the paygrade structure.

TABLE II.1

POPULATION PAYGRADE STRUCTURE

PAYGRADE	US	FOREIGN	TOTAL
O-2 (LTJG)	91	52	143
O-3 (LT)	1317	136	1453
O-4 (LCDR)	328	63	391
O-5 (CDR)	53	10	63
O-6 (CAPT)	15		15
DoD Civilian	20		20
Total Population	1824	261	2085

For the purposes of this study, foreign students are included in the population. The intent of MFH construction is

not for the housing of foreign students; however, provisions have been made for them to occupy military quarters [Ref 8:p. 5]. Foreign students come from varying socio-economic backgrounds. While they are guests of this country, it is assumed that it is in DoD's best interests to afford international students the opportunity to live under similar standards as the US military officers. DoD civilian students are included for the same reason.

B. ELIGIBILITY FOR MILITARY FAMILY HOUSING

Given the size of the total population, the number of members within the population who qualify for MFH can be identified. For a member of the population to qualify for a MFH unit, the member must have at least one legal dependent.

The number of population members who will qualify over the next several years is difficult to determine accurately. For requirements determination, the Naval Facilities Engineering Command applies a marriage factor to the population. The resulting number approximates the number of individuals who will qualify for MFH. The marriage factor used for officers is 68 percent. This factor will define personnel with one or more dependents. Therefore, with our population of 2,085 individuals, an estimated 1,418 members will qualify for the MFH good.

Table II.2 depicts the number of members eligible by paygrade. Table II.2 figures were derived by applying the marriage factor to Table II.1.

TABLE II.2

ELIGIBLE POPULATION PAYGRADE STRUCTURE

PAYGRADE	US	FOREIGN	TOTAL
O-2 (LTJG)	62	35	97
O-3 (LT)	896	93	989
O-4 (LCDR)	223	43	266
O-5 (CDR)	36	7	43
O-6 (CAPT)	9		9
DoD Civilian	14		14
Total Population	1240	178	1418

C. ASSIGNMENT OF AVAILABLE UNITS

There are 877 available units in La Mesa Village, the NPS military family housing area. It is divided into two categories, using criteria based on comparable officer rank and unit square footage. Category one has 296 total units (214 three bedroom units, 82 four bedroom units). These are considered adequate for field grade officers (O-4 and above). The square footage requirements set forth in Design Manual 35 make them more spacious than the homes in the second category. Category two units number 581 in total (72 two bedroom units, 466 three bedroom units, 43 four bedroom units) and are deemed adequate for company grade officers (O-3 and below) by Design Manual 35. [Ref 9:p. 1]

Field grade officers are assigned to category one units while company grade officers are assigned to category two units.

The unit size assignment is then determined by family size. This unit size assignment policy is depicted in Table II.3 [Ref 8:p. 3]. Since La Mesa Village has no two bedroom units for field grade officers, they are assigned units with a minimum of three bedrooms regardless of family size. The NPS housing authority exercises flexibility from OPNAV assignment policy in other areas as well. Officers with more than one dependent (including spouse) are put in three bedroom units or larger. Likewise, when an excess exists in field grade homes, company grade officers with three or more dependents are allowed to take those quarters. [Ref 10]

TABLE II.3

UNIT SIZE ASSIGNMENT POLICY

NUMBER OF DEPENDENTS (EXCLUDING SPOUSE)	NUMBER OF BEDROOMS
none	two
one	two
two except as follows	two
-one ten years or more	three
-one six years or more and the other of opposite sex	three
three except as follows	three
-two ten years or more	four
-one ten years or more and other two of opposite sex with one six years or more	four
four or more unless unusual circumstances prevail	four

The table above is built on two basic rules:

1. Each dependent over ten is entitled to a bedroom.

2. A dependent over six shall not share a bedroom with another dependent of the opposite sex.

The NPS housing assignment policy is consistent with OPNAV policy guidelines in attempting to house the maximum number of military families within the US military community. The NPS policy has two positive effects. One, company grade officer house waiting lists are reduced by allowing them to occupy excess field grade units. Two, company grade officers often occupy quarters larger than they would normally be entitled to. Since the field grade population typically seeking MFH is less than the number of field grade units available, they are not adversely affected by the housing policy.

All NPS US military students, staff officers and tenant command officers have first priority for La Mesa quarters. If the housing officer identifies excess quarters, they become available for eligible foreign military officers and DoD civilians. [Ref 8:p. 3]

D. INDIVIDUAL OPPORTUNITY COSTS

An individual's opportunity cost for NPS family quarters is determined by how much one is required to pay to occupy a housing unit in La Mesa Village. This amount will vary dependent upon which category the individual falls under. The opportunity costs defined below include utility costs:

1. US military officers forfeit their civil housing living allotment, BAQ/VHA. Table II.4 depicts these amounts for the Monterey area.

2. Foreign students pay $420 per month. This amount approximates average monthly maintenance and operation expenditures for one NPS housing unit plus $100 [Ref 10].

3. DoD civilians forfeit their per diem to occupy MFH. Per diem for civilians is established at a rate which is designed to match local housing costs. The three bedroom average rental cost in Monterey is $1340. [Ref 11]

TABLE II.4

BAQ/VHA ENTITLEMENTS

PAYGRADE	BAQ/VHA
O-2 (LTJG)	$713.93
O-3 (LT)	$804.33
O-4 (LCDR)	$975 40
O-5 (CDR)	$1087.29
O-6 (CAPT)	$1087.67

E. DOD OPPORTUNITY COSTS

The opportunity costs to DoD for providing MFH are summarized below:

1. Construction costs. DoD must Pay the cost of constructing MFH units. For the purposes of this study, construction costs for new units will be considered in the

analysis. Construction costs for units previously built will be considered sunk costs and will not be considered.

2. Operation and maintenance (O&M) costs. Members assigned to MFH receive utilities at no additional cost to the individual. This is consistent with the BAQ/VHA allowance for the private sector housing market which incudes pay for average utility costs. Therefore, DoD bears the cost of military housing utilities. Additionally, the costs of administering the units (housing office, staff and self-help tool check-out) are borne by DoD. Costs of repairing and painting the units are also the DoD's responsibility. The O&M cost for the NPS inventory is $3,840 per unit per year, or $320 monthly per unit [Ref 10].

While a vacant unit will require less utilities, the majority of the O&M costs are fixed and will be incurred whether a unit is occupied or vacant. Therefore, for purposes of this study, the O&M opportunity cost to the DoD will be defined as $320 per month for each unit whether occupied or vacant.

F. SHORTAGE

The number of additional MFH units required to satisfy demand is determined by two basic factors. First, the population eligible for MFH must be compared to the present number of units built and available. Second, it must be determined whether there is incentive for the eligible population to prefer MFH over civilian housing. Once the number

of units required to satisfy demand is determined, it must be determined whether it is in the DoD's interest to provide the housing units.

1. Supply and Demand

From Table II.2, the eligible population is stated at 1418 individuals. The housing inventory at NPS consists of 877 units. Therefore, 541 members of the eligible population currently reside in the private sector housing communities. This number would equal unsatisfied military housing demand if all members desired MFH.

2. Demand Considerations

For the analysis below, home purchase is not considered for two reasons. First, NPS tours of duty average 18-24 months for the vast majority of the population. This is less than the number of years normally considered reasonable to obtain a satisfactory return on investment. Second, Monterey house prices are too high for most of the population to qualify for a home mortgage loan. Therefore, it is reasonable to assume that most of the population will elect to rent rather than buy in the private sector.

The average home rental prices in the Monterey area are listed in Table II.5 below [Ref 11]:

TABLE II.5

MONTEREY AVERAGE RENTAL COST

Unit Size	Rental Cost
two bedroom	$930
three bedroom	$1340
four bedroom	$2125

Company grade officers can qualify for two, three or four bedroom units in MFH. Their BAQ/VHA ranges from $713.93 to $804.33, dependent upon their paygrade. It is evident that the opportunity cost for occupying government quarters ($713.93 to $804.33) is lower than the average rental cost for equivalent private sector costs ($930 to $2125). The disparity ranges from $125.67 ($930-$804.33) to $1411.07 ($2125-$713.93) Based on this data, it is economically prudent for all company grade officers to choose MFH over civilian housing.

Field grade officers qualify for three and four bedroom units in MFH. Their BAQ/VHA ranges from $975.40 to $1087.67. Thus, their opportunity cost for occupying MFH is also lower than the average rental costs for similar sized units in the private sector. Their marginal benefit for occupying MFH ranges from $252.33 ($1340-$1087.67) to $1149.60 ($2125-$975.40). The minimum marginal benefit of living in MFH is greater for a field officer than for a company grade officer.

The marginal benefit for a foreign student to occupy MFH can be computed in a similar manner as was done for the US military officers. Their marginal benefits range from $325 to

$1705. A strong economic incentive exists for the foreign student to acquire MFH.

For DoD civilians, the MFH and private sector housing costs are approximately equal. Their per diem is established to match local housing costs. Since they are adequately reimbursed for civilian housing, they are not considered in need of MFH.

Economic factors other than the housing costs discussed above are negligible in Monterey. Many of the economic benefits normally associated with military housing are easily obtained in the private sector. These benefits include the close proximity of commissary, hospital, retail shopping and work from the military housing area. Commuting costs to obtain these military services do not increase significantly in the private sector market since adequate civilian housing exists in close proximity to NPS. For this reason, they will not be considered in the analysis.

Many factors exist which might determine a family's desire for particular housing. A list of subjective factors includes: schools, medical services, churches, safety, recreational facilities, environmental beauty, and the housing quality. MFH is built with stringent specifications to meet most of the subjective factors listed above. NPS, in particular, has gained an excellent reputation for the quality of life its facilities provide. However, comparing one home's contribution to quality of life with another home's contribution is subjective and difficult to ascertain. Therefore, it is

assumed that the eligible population makes its housing choice, MFH or private sector housing, based on economic factors alone. In the current circumstances, this assumption appears valid due to the huge disparity between MFH and private sector housing opportunity costs.

The opportunity cost of obtaining MFH is less than the opportunity cost of acquiring a private sector unit for both US military officers and foreign students. A total of 527 US and foreign officers have demand for MFH units which are currently not available.

3. Supply Considerations

In paragraph II.E, the present government O&M opportunity cost to provide MFH was calculated at $320 per month per member. This cost is less than the BAQ/VHA it must pay the eligible US military officers to live in the private sector. It is also less than the amount that foreign students pay to occupy MFH. Therefore, if the DoD could provide up to 527 additional existing MFH units to the population, it would benefit economically.

The previous analysis does not account for new military construction to provide additional housing. If the DoD was required to pay for the construction of new units, the costs would no longer be sunk costs as they are for existing MFH. DoD's overall opportunity cost for the provision of MFH must include O&M costs and new construction costs. Therefore, any alternative to increase the MFH supply which requires new

construction may increase the overall DoD opportunity cost. This may make it cost prohibitive for DoD to adopt that alternative.

4. MFH Demand by Unit Size

A market analysis was conducted for the NPS population in May 1988. The number of two, three and four bedroom units required to satisfy eligible members' demand was determined for 1987 and projected to 1992. The population projection of members eligible for MFH in this study was consistent with current needs. [Ref 12:pp. 41-49] Likewise, the determination of unit size demand was consistent with current unit demand as determined by the NPS Housing Office [Ref 9].

Appendix A is a breakdown of NPS housing requirements by paygrade and number of bedrooms. The breakdown of bedroom requirements was calculated by applying 1987 paygrade unit size demand factors to the current eligible population. The statistics reveal a large deficit (727 units) of two bedroom units for company grade officers. Due to the excess of company grade three bedroom units, some would be housed in these units. However, 490 families would still require equivalent two bedroom housing in the private sector.

Deficits or excesses for other units are not significant. Therefore, increasing the supply of company grade two bedroom units is the basis for the unit size used in the analysis in Chapter IV.

III. ALTERNATIVES

A. MILITARY CONSTRUCTION

Military construction (MILCON) is the traditional method for building family housing, but due to rising construction costs, it is becoming a less common practice. Nonetheless, DoD may request MILCON funds for the purpose of constructing MFH units. MILCON is constructed only in those geographic areas where the civilian housing market cannot meet the needs of the local military community.

The time span from identification of a requirement for MILCON until the housing is ready for occupancy is a minimum of four years. The minimum four years is achieved only if the need is considered so critical that it is placed in the Program Objective Memorandum (POM) upon identification. If the requirement is placed in an outyear of the Six Year Defense Plan (SYDP), it may be ten years prior to occupancy. As these projects become consolidated into the DoD budget process, they often get reduced in priority, often falling back to the next year's budget. Eventually, some lose their funding.

The large cost of construction puts projects at odds with other programs within a constrained budgetary environment. DoD and the Congress must prioritize and sometimes choose between housing and weapons systems. For this reason, alternatives to MILCON have been developed.

B. SECTION 801 BUILD-TO-LEASE

Section 801 is a public/private venture program which was established by the 1984 Military Construction Authorization Act. It has been renewed each year since then with minor changes to the original legislation. Under Section 801 of the 1984 legislation, the government can lease a project built by a private developer. [Ref 13:p. 1]

The build-to-lease projects are those where DoD leases a newly constructed housing project, for a period of up to 20 years, from a private developer. The legislation authorizes the Secretary of each service to enter into a specified number of contracts for housing projects of approximately 300 units. The number of contracts and size of the projects have varied each year, dependent upon congressional legislation. [Ref 13:p. 1]

The act stipulated that 801 projects be limited to new construction where a validated deficit in family housing exists. The lease amount is divided into a shelter rent (in theory, the amount needed to amortize construction costs) and a maintenance rent (to cover the cost of maintaining the project after construction). This division is made because shelter rent is held constant throughout the life of the lease while maintenance rent changes based on the Housing, Shelter, Maintenance and Repair Index of the "Economic Indictors." The latter are prepared by the Council of Economic Advisors for Congress. In addition, the government will pay 80 percent of any yearly

increase in total general real estate taxes after the second year of the agreement. [Ref 13:p. 7]

Under the law, other specific conditions and restrictions apply to the build-to-lease program [Ref 13:pp. 7-8]:

1. The project must be built on or near a military installation.

2. Eligible service members are assigned quarters rent-free.

3. Contracts are awarded through public advertising, competitive bidding and negotiated contracting procedures.

4. Contracts may provide for the contractor to maintain and operate the project throughout the duration of the lease.

5. Units must be built to DoD specification.

6. The lease is set for a maximum of 20 years after construction completion.

An economic analysis demonstrating that the project is cost effective compared to other housing provision alternatives must be submitted to the appropriate congressional subcommittee for approval. Congress has 21 days to respond or the proposal is considered accepted.

There are two alternatives to this program. Under the first alternative, the contractor builds the housing structure on the military installation or government land. Upon lease expiration, the government may continue to lease the structure, purchase the structure or lease the land to the contractor for their own private use.

Under the second alternative, the construction of the buildings is done off-base. In return for the contractor building the project, DoD agrees to lease the family units. At the end of the lease period, DoD does not have the option of renewing the lease. DoD does have the option of purchasing the property at fair market value. [Ref 14:p. 6]

C. SECTION 802 RENTAL GUARANTEE

This rental guarantee program was passed under the same 1984 Military Construction Authorization Act. Under Section 802, the government guarantees up to 97 percent occupancy of the privately owned housing when the owner agrees to give priority consideration to renting to service members. Like the Section 801 program, the Secretary of each military service is given a number of projects (a project is normally limited to 300 units) which he can begin each year. The lease amount is determined in a fashion similar to the build-to-lease program's procedures. [Ref 13: p. 1]

Most of the restrictions and conditions set for the rental guarantee program are the same as for the build-to-lease program. The following are a few exceptions [Ref 13:p. 7-8]:

1. The rental guarantee may not exceed 97 percent of the units. The individual service member pays the rent expenses.

2. Initial rents shall not be more than rates for comparable units in the same general area.

3. The agreed upon rental-guarantee amount shall not be more than an amount equal to the shelter rent of the units as determined by amortizing initial construction costs.

4. The rental guarantee is limited to a maximum 25-year guarantee and is not renewable.

5. If the owner does not maintain a satisfactory level of maintenance and operations, the contract can be declared null and void.

The same rule (as in the 801 program) applies to submitting an economic analysis to the appropriate congressional subcommittee to prove a contract cost-effective. Congress has 21 days to respond or it is considered approved.

D. TITLE 10 2667 LEASE

This program has drawn much attention in recent years. Only two finished projects exist, Brostrom Park and Sun Bay Apartments of Fort Ord, but their huge success has made them models for future projects. Like the two private/public venture programs mentioned previously, the 2667 program utilizes the private sector to build the housing. It differs from the Section 801 and Section 802 programs in the following ways [Ref 15:pp. 61-62]:

1. Housing units are not required to be built to DoD specifications. This reduces cost for the contractor and saves DoD manhours.

2. Lease periods are set for a minimum of five years, but there is no maximum duration.

3. Lease authority exists such that the service Secretary may lease nonexcess Federal property under his jurisdiction for construction purposes. This gives the service Secretary and the installation commander more flexibility in choosing the construction site.

4. 2667 leases must be approved by the House Armed Services Committee.

5. 2667 lease projects are not affected by the Davis-Bacon Wage Act. This act requires that standard wages, set by the Department of Labor, be payed to construction workers on certain federal projects. It has been estimated that the Davis-Bacon Wage Act requirements increase construction costs between five and fifteen percent [Ref 16:p. 2]. In addition to the 801 and 802 programs, MILCON also falls under the cognizance of Davis-Bacon [Ref 17:p. 2].

Title 10 USCA Sec 2667 has existed for a number of years, but it was only with the Fort Ord lease programs that it was used for building military housing. It was intended to give the Secretary of an armed service the authority to lease land under his jurisdiction to promote the public interest or national defense. In the Fort Ord 2667 lease programs, the private firms both developed the DoD property and have managed the finished housing units.

E. TRANSFER

In areas where there are several military installations, members from one installation will be assigned housing at another installation if the first has a shortage of available units and the second has an excess. While there is currently a shortage of available MFH units at Fort Ord, the base may be scheduled for closure in Fiscal Year 1995. If the base is closed, the housing areas which comprise the Fort Ord MFH inventory will become excess housing. Since the Navy has a demonstrated need for units in the Monterey area, the Department of the Navy can request an interservice congressional transfer of housing assets from the Army to the Navy.

During conversation with staff members of the Fort Ord Housing Office, the MFH area known as Fitch Park was identified as a possible solution to the NPS housing shortage. There are certain criteria that the housing at Fort Ord must meet before it is considered suitable for assignment to NPS members.

1. Distance. A member cannot be assigned to MFH if travel distance is more than a one hour commute from his/her workplace during peak rush hour traffic. Fort Ord is located seven miles from NPS with a commute time of less than one hour during peak travel time. [Ref 8]

2. Square footage. Minimum square footage requirements are set by paygrade for assignment to MFH. The Fitch Park housing area consists of 450 units of officer housing for paygrades from O-1 to O-6. All units within the housing area would be

acceptable for assignment to officers of the appropriate rank. The other housing areas of Fort Ord are composed of a mix of officer and enlisted housing. The size of the enlisted units, in many cases, does not meet the minimum square footage requirements for officer's housing. For this reason, the mixed housing areas are rejected as potential housing units for the NPS population.

3. Bedroom entitlement. There is a mix of two, three and four bedroom units in the Fitch Park area which meet OPNAVINST 11101.13H requirements.

There were other extrinsic considerations to be examined in determining the viability of the transfer option. They are outlined below.

1. Utilities. Gas and electric service for the Fitch Park area is obtained commercially through Pacific Gas and Electric Company. The gas supply to Fitch Park comes off a main utility line which can be capped to provide discrete service. The electrical supply can be modified in the same way. Costs for these modifications will be borne by Pacific Gas and Electric. Telephone service will be unaffected by the closure.

2. Location. With the closure of the base, surrounding land may potentially be sold. Given this potential outcome, the units selected by NPS for annexation should be located in close proximity to one another so that the military area is clearly defined and military security more easily provided. An access road from the local road system to the housing is also

necessary. The Fitch Park housing area has 450 units of suitable housing which meet these criteria. North-South Road will provide access to the housing area from route 218 in Seaside.

3. Timeliness. The units' availability is another consideration. If Fort Ord closes, all Fitch Park units would be available for occupancy. Transfers for Fort Ord units may begin in 1993 [Ref 18]. If Fitch Park units become available due to these transfers, assignment of NPS members can begin. Thus, the time to begin occupancy of these units could be within two years.

F. STATUS QUO

One alternative would be to maintain the status quo. That is, to continue to supply the current 877 MFH units to the population and house the additional 527 eligible members in the private sector. This would be rational if none of the previous alternatives are cost-effective and feasible.

IV. ANALYSIS

A. METHODOLOGY, ASSUMPTIONS AND TERMS

The economic analysis that ensues is a comparison of the alternatives proposed in Chapter III. Office of Manpower and Budget (OMB) Circular A-104 provides the guidelines for making 'buy versus lease' cost analysis. The methodology that follows is consistent with those guidelines. It expresses all future costs in then-year dollars, and then discounts them to determine their present value. The results of the 'buy versus lease' analysis are maximum lease payment levels, or ceilings, which ensure that the net present value (NPV) of the alternatives are comparable to the *MILCON option. The 801 and 802* lease programs' NPV may be no greater than 95 percent of the MILCON NPV for DoD acceptance. There are no maximum NPV restrictions for the 2667 lease program. [Ref 19]

In addition to the NPV analysis, program evaluation will include three other cost estimates. They are DoD initial outlay of funds, DoD monthly cost and service member (SM) monthly cost. Therefore, program analysis will be based upon the four following economic factors:

1. Program NPV
2. DoD initial outlay
3. DoD monthly cost
4. SM monthly cost

The analysis makes the following assumptions:

1. The structure life for new construction is 45 years.

2. New housing would be constructed on government land. There are 12.92 acres of land at the La Mesa housing area suitable for housing with access to existing circulation patterns and utility lines. [Ref 12:p.15]

3. Project size will consist of 300 two bedroom units. Minimum square footage per unit (750 square feet), as defined by OMB, is used. This number is less than the amount necessary to house the total population requiring MFH, but it is selected due to land space and historical MFH project size.

4. The 801 and 802 program lease periods are set for the maximum period of 20 years. The 2667 program does not have the same period constraint, but economic analysis will include only the first 20 years of lease time to achieve consistency.

5. In order to facilitate the estimate of tax revenues and imputed residual value, it is assumed that a demand for the housing facilities will exist beyond the analysis period.

Prior to performing the analysis, investigations were made to determine expense elements which should be addressed. Calculations were performed to estimate the present value of the stream of future expenditures required for the implementation of each alternative. Future cash flows are first adjusted for inflation, and then discounted to determine their present value.

The DoD Construction Cost Guide and, in particular, the Tri-Service Cost Model, were used to estimate construction cost.

The Tri-Service Cost Model is used by DoD to determine construction and support costs for housing projects. A baseline construction cost is computed based upon a standard housing cost per net square foot and the project square footage. Factors relating to project size, unit size, area cost, support, overhead and contingencies are applied to this dollar figure to determine the overall construction costs. When applicable, the resources at Naval Facilities Engineering Command, San Bruno, California were used for the cost estimations. [Ref 13:pp. 14-18]

The computation of various expenditures to generate the NPV of each alternative required additional assumptions. They include:

1. A discount rate of 9.1 percent is applied (per OMB and DoD guidelines) to determine the present value of current dollar expenditures [Ref 20:p. 5]. This is 0.125 percent greater than the average of 10-year and 30-year Treasury Bonds as of 15 October 1990 [Ref 21:p.8].

2. Price level changes are calculated according to the values released by the Navy Comptroller as of 3 May 1990. The initial inflation factor is four percent and reduces to 3.1 percent in 1995. It remains at 3.1 percent through the duration of the analysis period.

3. Costs to the government which do not reflect direct expenditures are referred to as imputed costs. OMB Circular A-104 requires that imputed costs be added to the cost of the MILCON alternative for insurance, local taxes, and one-time

impact or development fees. The annual insurance expense estimate of $50,000 is based on property and earthquake insurance quotations from Monterey insurance firms. Local property taxes on land and improvements, which is governed by California Proposition 13, are estimated to be 1.1 percent [Ref 21]. The impact and development fee estimate, $770,000, covers a wide range of possible one-time charges, including a school district fee, building fee, site development fee and water connection fee. The estimate used in the analysis is based on a value used by NAVFAC in a previous build-to-lease economic analysis. [Ref 21:p. 12]

4. The length of the analysis period is 21 years (FY 1991 through FY2011). The lease alternative assumes the residential units revert to private control when the lease period expires.

5. Building for all new construction units alternatives is assumed to be completed by FY 1992. Units are assumed to be delivered starting the second half of FY 1991. For purposes of the analysis, MILCON funds are assumed to be committed in FY 1991, and rent payments and maintenance costs for FY 1991 assume an occupancy level of 25 percent for the year.

6. OMB Circular A-104 requires that prices for government land must be set at fair market value and included in the economic analysis. A survey of Monterey real estate appraisers was conducted, but true fair market value could not be determined without a complete survey of the land. All real

estate appraisers stated that Monterey Pennisula land value varied widely. Land value is assumed to be $700,000.

7. A land appreciation rate of 1.5 percent and building deterioration rate of 2.2 percent is assumed. This is based on a previous build-to-lease analysis [Ref 21:p. 7].

8. Operations and Maintenance (O&M) costs are assumed to be $150 per unit per month. This estimate is based on historical data used in computing NPV for previous 801 programs as well as current NPS Monterey family housing O&M costs. Utility costs are not included in the O&M cost figures. [Ref 10]

9. Utility costs are assumed to be $100 per unit per month. This value is based upon an average of NPS Monterey MFH costs and the private sector two bedroom costs as determined by the Fort Ord Housing Office [Ref 11]. Utility cost is not considered in NPV calculations; however, it is included in the monthly cost estimates.

10. Terminal value of the property and buildings (MILCON alternative) is based on a 45 year life expectancy taken from the Marshall Valuation Service.

Terms which appear frequently in the analysis are defined as follows:

1. Shelter rent. It is a cost element in the 801 and 802 programs. In theory, this is the amount needed to amortize construction costs over the life of the lease. Shelter rent is required, by law, to be kept constant throughout the life of the

lease. It is one of the two components that make up the total monthly lease (or rent) amount in the 801 (or 802) program.

2. Maintenance rent. This is the second component that makes up the total monthly lease (or rent) amount in the 801 (or 802) program. This value covers the cost of maintaining the project after construction. It will equal the O&M costs used in MILCON NPV estimations since family housing O&M costs are used for the 801 program NPV estimate. Unlike the shelter rent, it does increase with inflation.

3. BAQ/VHA. It is pay a service member receives to help offset the cost of civilian housing. It is designed to pay for 85 percent of the total housing cost. Total housing cost is defined as rental fee, maintenance fee and utility expenses.

4. Initial outlay. DoD funds required to initiate a program. The initial outlay is not an element of monthly cost.

5. Total monthly cost. It is the first-year total monthly housing expense per unit. It is important to distinguish the first year cost from costs in the following years. In the 801 and 802 programs, a large portion of the monthly cost (shelter rent) is held constant. In the other options, 100 percent of the total monthly cost is impacted by inflation.

6. DoD monthly cost. It is that portion of the total monthly cost which DoD is required to disburse.

7. Service member cost. It is defined as the housing expense a service member must pay beyond the amount that is received in BAQ/VHA.

8. Net present value. It represents the costs that DoD incurs over the 21 year analysis period. Utility costs are omitted from NPV calculation (per OMB guidelines).

B. MILITARY CONSTRUCTION

1. Description

Construction will consist of 300 multi-unit, two story, two bedroom wood frame family housing units built to MILCON specifications. The development will be owned, operated and maintained by the US Navy at NPS Monterey.

2. NPV Cost Elements

a. Construction cost

b. Land cost

c. Insurance expense

d. Imputed impact/development fees

e. Imputed real estate tax

f. Terminal value of property and buildings

g. Operation and maintenance cost

3. Analysis

Construction cost is calculated using the Tri-Service Cost Model and is estimated at $18,900,000 [Ref 23]. The other cost elements (listed as b through f in subheading 2 above) are combined with the construction cost to determine the initial MILCON NPV. The terminal value of property and building reduces the NPV to less than the construction cost figure. Initial MILCON NPV is estimated at $18,298,916 [Ref 21:p. 12].

Estimated O&M NPV is $6,486,308 (Appendix B). The sum of initial MILCON NPV and O&M NPV is defined as MILCON NPV. The 801 and 802 programs' NPVs can be no greater than 95 percent of MILCON NPV for DoD program acceptance. The initial outlay required by DoD is equal to the construction cost. The MILCON project would be funded at the initial outlay value in the defense budget.

Total monthly cost consists of O&M and utility costs, and they are incurred by DoD. Service member cost is zero since he occupies MFH at no cost. Table IV.1 summarizes the data.

DoD's usual MILCON project planning allows for maximum allowable square footage to be applied for the bedroom size desired. For a two bedroom unit, 950 square feet, vice 750 square feet, would be the planned unit size. A project built to these specifications would increase construction costs to $23,510,000. This increased cost would raise the NPV of the MILCON project approximately $4,000,000 to a total NPV of $28,785,224. However, the minimum allowable square footage will be used for comparison purposes throughout the remainder of this analysis.

A major advantage to building with the MILCON alternative is the certainty, barring unforseen disaster, that the housing will still exist for military use at a reduced cost (O&M and utility costs) after the lease period ends. The lease programs continue to include construction cost as a part of the monthly expense.

TABLE IV.1

MILCON PROGRAM

Summary	
Initial NPV	$18,298,916
O&M NPV	$6,486,308
MILCON NPV	$24,785,224
Initial Outlay	$18,900,000
Total Monthly Cost	$250
DoD Monthly Cost	$250
SM Monthly Cost	$0
MILCON Data	
Construction Cost	$18,900,000
Land Cost	$700,000
Annual Insurance Expense	$50,000
Impact/Development Fee	$777,000
Real Estate Tax Rate	1.1%
Real Estate Tax Increase Rate	2.2%
Land Appreciation Rate	1.5%

C. SECTION 801 BUILD-TO-LEASE

1. Description

DoD contracts with a developer to construct a 300 multi-unit, multi-story, two bedroom family housing complex. The complex is to be built to MILCON specifications on NPS Monterey land. The developer will own, operate and maintain the

housing complex for the duration of the 20 year lease period. DoD is to pay the developer a monthly rent as established in the lease agreement.

2. NPV Cost Elements

a. 95 percent MILCON NPV

b. Shelter rent

c. Maintenance rent

3. Analysis

A contractor puts in a bid in reply to the DoD Request for Proposal (RFP). In a study of five previous 801 projects, the contractors' bids were approximately 95 percent of MILCON costs in every case. These bids become financially binding to both DoD and the contractor when written into the lease contract. Therefore, 95 percent of initial MILCON NPV is used as the 801 program construction cost. [Ref 13:pp. 18-19]

O&M NPV (Appendix B) is added to the construction estimate to determine 801 program NPV. The 801 program NPV is estimated at $23,870,278. There is no initial outlay for DoD since the developer bears the expense of construction.

The monthly shelter rent is computed at $556 [Ref 21:p. 13]. The first year monthly maintenance rent is assumed to be $150. The shelter and maintenance rents combine with the utility cost to make up the total monthly cost ($806). DoD assumes the utility cost as it does in the MILCON alternative, and, therefore, pays the full total monthly cost.

TABLE IV.2

SECTION 801 PROGRAM

95 Percent Initial NPV	$17,383,970
O&M NPV	$6,486,308
801 Program NPV	$23,870,278
Initial Outlay	$0
Total Monthly Cost	$806
DoD Monthly Cost	$806
SM Monthly Cost	$0

The big advantage the 801 program has over the MILCON alternative is the zero initial outlay. Dollars do not have to be provided in the Defense Authorization Bill to finance the program. Also, there exists a small NPV economic gain in the initial lease period. However, the small NPV advantage would erode rapidly if the need for housing existed beyond the 20 year period. The service member costs are the same under either program.

D. SECTION 802 RENTAL GUARANTEE

1. Description

DoD contracts with the developer to construct a 300 multi-unit, multi-story, two bedroom family housing complex on NPS Monterey property. The units are built to MILCON specifications. The developer owns, operates and maintains the housing complex for the duration of the 20 year lease period. DoD guarantees the developer a 97 percent occupancy rate.

The rental amount is limited by the lease agreement, and rent is paid directly to the developer by the service members.

2. NPV Cost Elements

a. BAQ/VHA

b. Utility cost

c. Shelter rent

d. Maintenance rent

3. Analysis

DoD uses a formula based on BAQ/VHA to set the ceiling cost for 802 program housing. This must fall within 95 percent of the MILCON NPV estimate or the program is rejected by DoD. BAQ/VHA is designed such that it will offset 85 percent of a service member's total housing costs (including utilities). DoD does not include utilities in its NPV calculations to compare MILCON and build-to-lease projects. Therefore, the formula used is [Ref 13:p. 17]:

Total Monthly First-Year Cost=(BAQ/VHA)/0.85-Utility Costs

Assuming BAQ/VHA is $804.33 and utility costs are $100, the monthly total first year cost is $846.27. Shelter rent and maintenance rent are the two components of the monthly total first year cost. Since O&M costs are $150, then shelter rent is $696.27 and maintenance rent is $150.

The maintenance rent NPV, adjusted for inflation, is the same as the O&M NPV (Appendix B). Shelter rent NPV, not adusted for inflation, can be calculated as follows:

NPV(x,n,r)=NPV of $x paid every year over n years at a discount rate of r

=x{[1-((1+r)exp(-n))]/r}

NPV(2506572,20,.091)=2,506,572(9.06387)

=$22,719,231

802 program NPV is determined to be $29,205,539 ($6,486,308 + $22,719,231).

Total monthly cost is the sum of shelter rent, maintenance rent and utility cost ($946.27). Under the 802 program, service members pay rent directly to the contractor. First year total rent ($846.27) exceeds maximum BAQ/VHA ($804.33); therefore, the service member will pay the difference ($41.96) plus utility expenses ($100).

TABLE IV.3

SECTION 802 PROGRAM

Shelter Rent NPV	$22,719,231
Maintenance Rent NPV	$6,486,308
802 Program NPV	$29,205,539
Initial Outlay	$0
Total Monthly Cost	$946
DoD Monthly Cost	$804
SM Monthly Cost	$142

The 802 program NPV is higher than the MILCON NPV. Since 802 NPV does not fall within 95 percent of MILCON NPV, DoD would reject it as an option. This analysis emphasizes the weaknesses of the 802 program. It does not work in high cost

areas. The formula pushes the cost ceiling too high for it to be acceptable by DoD standards.

E. TITLE 10 2667 LEASE

1. Description

DoD contracts with a developer to construct a 300 multi-unit, multi-story, two bedroom family housing complex on NPS Monterey property. The units are not required to be built to MILCON specifications. The developer owns, operates and maintains the housing complex for the duration of the 20 year lease period. Initial rent amount is set in the lease agreement, and increases with inflation. Service members pay rent directly to the developer.

2. NPV Cost Elements

a. Initial rent amount

b. BAQ/VHA

3. Analysis

DoD costs in this project will be the amount of BAQ/VHA paid to the service members occupying the units. BAQ/VHA entitlements will be set at the maximum amount if the rental amount is equal to or greater than the BAQ/VHA maximum. If the rental amount is less than the BAQ/VHA maximum, DoD pays the service member the rental amount plus 50 percent of the difference. Therefore, to determine DoD costs, the contractor's initial rental charge must be calculated.

Contractor rental charges will reflect initial construction costs, various projected costs (primarily O&M) and the desired profit. If the assumption is made that the projected costs and desired profit of two similar projects in the same area are the same, then initial construction costs should be the determining factor in the rental price difference between the two projects.

The assumptions made in the previous paragraph are used to determine the 2667 program cost element, initial rental amount. The 2667 program project, Sun Bay of Fort Ord, had construction costs of $17,000,000 [Ref 24]. The project consisted of 297 units totaling 138,900 square feet (463 square feet per unit). This figure equates to $57,239 per unit. First year rental costs averaged $575 per unit [Ref 25]. If construction costs for the proposed 2667 lease project could be calculated, then the Sun Bay cost-per-unit/rental-price ratio could be used to approximate the initial rental price for the proposed 2667 lease project units.

The Tri-Service Cost Model was used to approxiamte the construction costs for the proposed project. Using the Sun Bay construction costs and appropriate factors supplied by NAVFAC, the Sun Bay construction cost per square foot was computed by working backwards through the model (Appendix C).The construction cost per square foot factor ($69) was then entered into the model along with project factors fitting the proposed

2667 project construction costs. The proposed 2667 project construction costs were estimated at $26,628,750 (Appendix D).

With construction costs of $26,628,750, the proposed project's cost per unit is $88,762. Applying the cost-per-unit/rent-per-unit ratio from the Sun Bay project, the 2667 lease project rent is $892. This rental amount is greater than a service member's (O-3 paygrade) BAQ/VHA; therefore, the BAQ/VHA becomes the relevant cost element. Using the BAQ/VHA entitlement figure, the 2667 lease NPV is calculated in Appendix E.

Total monthly cost consists of the rental amount ($892) and utility cost ($100). DoD's monthly cost is the BAQ/VHA payment and the service member absorbs the balance of the total monthly cost.

TABLE IV.4

SECTION 2667 PROGRAM

2667 Lease NPV	$34,751,845
Total Monthly Cost	$992
DoD Monthly Cost	$804
SM Monthly Cost	$188

Although DoD monthly costs are equal for both the 802 and 2667 programs, the 802 program has a lower NPV. This is due to the 802 program shelter rent being held constant throughout the lease period. The rent that the contractor can charge will not keep pace with inflation. On the other hand, 100 percent of 2667 program rent is tied to inflation.

The 2667 project has a much higher NPV than both the MILCON project and the 801 project. However, it is possible that support costs were overstated in the NPV calculation. The model estimated support costs based on project square footage. It is uncertain whether an increase in unit size, without an increase in number of bedrooms, would increase Sun Bay support costs. Sun Bay has built considerable amenities into its complex (recreational facilities, landscaping, and a spacious road system) that are more reliant on tenant quantity than square footage. Since the proposed project is not designed for a significant increase of inhabitants compared to Sun Bay, support costs should not increase significantly.

If support costs were assumed equal for the Sun Bay and proposed projects, 2667 project NPV would be reduced to $24,365,247. Rental price would be reduced to $816. The 2667 program NPV is still significantly higher, but the rental price is approaching the maximum BAQ/VHA.

There is reason to reconsider utility cost as well. One might suspect that if one receives unlimited utilities for no cost, then utility cost is increased. The three bedroom average for utilities in Monterey is $100, but NPS Monterey averages $128 in utility cost per unit [Ref 11]. Unless one believes that military people will have increased utility use regardless of cost, 2667 project tenants' utility cost will approximate the Monterey average. If the two bedroom average cost of $75 is used, utility cost is reduced $25 a month. This utility cost

reduction applies to the 802 program and staus quo alternative as well.

The combined effect of applying the support cost and utility corrections lowers total monthly cost approximately $100. This lowers the service members cost by $100 to $88 since DoD monthly cost is locked in at the BAQ/VHA rate for rents above the maximum entitlement. NPV and total monthly costs remain higher than for the 801 program. DoD costs are slightly lower than under the 801 program regardless of the correction application.

F. TRANSFER

1. Description

300 units from the Fort Ord family housing inventory are transferred to the NPS Monterey housing inventory. The units will be operated and maintained by the NPS Monterey Housing Office.

2. NPS Cost Elements

a. O&M NPV

b. Opportunity cost

3. Analysis

Before DoD can sell Fort Ord housing on the open market, other federal and state agencies have the option to acquire use of the land. For this reason, it is doubtful that Fort Ord housing would be sold. Therefore, DoD's opportunity cost is assessed as zero.

Costs to DoD are only those necessary to keep the units operating. Transfer NPV is the O&M NPV (Appendix B). Total monthly costs are assumed by DoD, and they are equal to the monthly O&M cost plus utilities cost.

TABLE IV.5

TRANSFER

Transfer NPV	$6,486,308
Total Monthly Cost	$250
DoD Monthly Cost	$250
SM Monthly Cost	$0

The transfer NPV is approximately 25 percent of the 801 program NPV (lowest NPV of previous three alternatives). The total monthly cost and service member costs are equal to the previous lowest values. Obviously, this is the most economical alternative considered to this point.

G. STATUS QUO

1. Description

No new housing units are constructed or transferred to the NPS Monterey family housing inventory. Three hundred members continue to reside in the civilian community.

2. DoD Cost Element

The only cost element is the BAQ/VHA that is paid to service members who reside in civilian housing.

3. Analysis

The status quo NPV is determined by BAQ/VHA amount, and it is calculated in Appendix E. Total monthly cost consists of the total housing costs ($955) for a two bedroom unit in the Monterey civilian housing market. DoD monthly cost is the BAQ/VHA payment, and SM monthly cost is the difference between total monthly cost and BAQ/VHA ($955-$804).

TABLE IV.6

STATUS QUO

Status Quo NPV	$34,751,845
Total Monthly Cost	$955
DoD Monthly Cost	$804
SM Monthly Cost	$151

The average two bedroom apartment size is approximately 500 to 600 square feet. Therefore, the costs determined for the status quo reflect costs for a home significantly smaller in size than the other alternatives.

H. SUMMARY

The results of the economic analysis of each alternative are displayed in Table IV.7. The Section 2667 program figures are based on support costs set equal to estimated Sun Bay project support costs. Monterey's average two bedroom utility cost is used for the Section 802, Section 2667 and Status Quo alternatives.

TABLE IV.7

ECONOMIC ANALYSIS SUMMARY

Alternative	NPV	Initial Outlay	DoD	SM
MILCON	$24,785,224	$18,900,000	$250	$0
SECTION 801	$23,870,278	$0	$806	$0
SECTION 802	$29,205,539	$0	$804	$117
SECTION 2667	$34,751,845	$0	$804	$88
TRANSFER	$6,486,308	$0	$250	$0
STATUS QUO	$34,751,845	$0	$804	$126

V. CONCLUSIONS AND RECOMMENDATIONS

The conclusions and recommendations from the research are summarized below.

A. CONCLUSIONS

1. An economic comparison of the six alternatives reveals the Fort Ord housing transfer option to be the most cost effective. Its strengths include zero initial outlay, zero costs for the service member and the lowest NPV of the six alternatives.

2. The four new construction alternatives all proved better options than maintaining the status quo. If MILCON's initial outlay was amortized monthly over a 20 year period, the DoD monthly costs would be approximately equal for the five alternatives. However, the new construction alternatives reduced costs for the service member.

3. The Section 801 build-to-lease program is the best of the new construction alternatives. The MILCON program provides benefits similar to the Section 801 program, but its large initial outlay makes it difficult to gain fiscal support in the present budget consious environment. Significantly lower service member costs make the Section 801 program a better alternative than the other two private/public ventures.

4. DoD's use of the two different models for evaluating the Section 801 and 802 programs makes it difficult to compare the two programs. A wide disparity between NPV figures was calculated, but their DoD monthly costs did not correlate to this disparity.

B. RECOMMENDATIONS

1. If Congressional legislative action should close Fort Ord, the NPS Monterey Housing Authority should request an interservice transfer of Fort Ord housing assets to its inventory.

2. The NPS Monterey Housing Authority should pursue construction of a Section 801 build-to-lease project.

3. The Naval Facilities Engineering Command should investigate the disparity in the two different models used to evaluate the Section 801 and Section 802 programs.

APPENDIX A

HOUSING UNIT REQUIREMENTS

Company Grade (CG)	2BR	3BR	4BR
Assets	72	466	43
Demand:			
O-2	71	20	6
O-3	728	209	52
Total CG Demand	799	229	58
CG Shortage	727	(237)	15

Field Grade (FG)	3BR	4BR
Assets	214	96
Demand:		
O-4	222	44
O-5 and above	36	16
Total FG Demand	258	60
FG Shortage	44	(36)

APPENDIX B

O & M NPV

Fiscal Year	O & M	Discount Factor	Net Present Value (NPV)	Cumulative NPV
1991	135,000	1.000	135,000	135,000
1992	561,600	0.917	514,987	649,987
1993	582,120	0.840	488,981	1,138,968
1994	602,000	0.770	463,617	1,602,585
1995	621,000	0.706	438,426	2,041,011
1996	639,900	0.647	414,015	2,455,026
1997	659,880	0.593	391,309	2,846,725
1998	680,400	0.544	370,138	3,216,863
1999	701,460	0.498	349,327	3,566,190
2000	723,060	0.457	330,438	3,896,628
2001	745,740	0.419	312,465	4,209,093
2002	768,960	0.384	295,281	4,509,374
2003	792,720	0.352	279,037	4,788,411
2004	817,020	0.322	263,080	5,051,491
2005	842,400	0.295	248,508	5,299,999
2006	868,860	0.271	235,461	5,535,460
2007	895,320	0.248	222,039	5,757,499
2008	923,400	0.227	209,612	5,967,111
2009	952,020	0.209	198,972	6,166,083
2010	981,180	0.191	187,405	6,353,488
2011	758,970	0.175	132,820	6,486,308

APPENDIX C

SUN BAY CONSTRUCTION COSTS

Total Project Cost=	$17,000,000
UNADJ Project Cost x	
CONTxSIOH	
Contingency Factor	1.05
SIOH FACTOR	1.06
UNADJ Project=	$15,274,034
ADJ Baseline x	
Support Factor	
Support Factor	1.30
ADJ Baseline=	$11,749,257
Baseline x	
Project Factors	
Area Cost Factor	1.20
Project Size Factor	0.99
Unit Size Factor	1.06
Baseline=	$9,621,705
Total Square Feet	138,900
Cost Per Net Sqare Feet	$69.27

APPENDIX D

2667 LEASE CONSTRUCTION COST

Total Square Feet	225,000
Cost Per Net Square Foot	x$69.27
Baseline Cost	$15,585,750
Area Cost Factor	x1.20
Project Size Factor	x0.99
Unit Size Factor	x1.03
ADJ Baseline	$19,071,347
Support Factor	x1.30
UNADJ Project	$26,082,385
SIOH Factor	x1.01
Contingency Factor	x1.05
Project Cost	$26,628,750

APPENDIX E

BAQ/VHA NPV

Year	BAQ / VHA	DF	NPV	CUM NPV
0	723,897	1.000	723,897	723,897
1	3,011,412	0.917	2,761,464	3,485,361
2	3,121,411	0.840	2,621,985	6,107,346
3	3,228,547	0.770	2,485,981	8,593,327
4	3,329,892	0.706	2,350,904	10,944,231
5	3,431,236	0.647	2,220,010	13,164,424
6	3,538,372	0.593	2,098,255	15,262,679
7	3,648,403	0.544	1,984,731	17,247,410
8	3,761,330	0.498	1,877,142	19,120,552
9	3,877,152	0.457	1,771,859	20,892,411
10	3,998,766	0.419	1,675,483	22,567,894
11	4,123,275	0.384	1,583,337	24,151,231
12	4,250,679	0.352	1,496,239	25,647,470
13	4,380,979	0.322	1,410,675	27,058,145
14	4,517,071	0.295	1,332,536	28,390,681
15	4,658,953	0.271	1,262,576	29,653,257
16	4,800,835	0.248	1,190,607	30,893,864
17	4,951,404	0.227	1,123,969	31,967,833
18	5,104,869	0.209	1,066,918	33,034,751
19	5,261,229	0.191	1,004,895	34,034,751
20	4,069,707	0.175	712,199	34,751,845

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